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The Scottish Naturalist

Volume 109 1997

Part Two

Annual Subscription £35.00

A Journal of Scottish Natural History

THE SCOTTISH NATURALIST

Founded 1871

A Journal of Scottish Natural History

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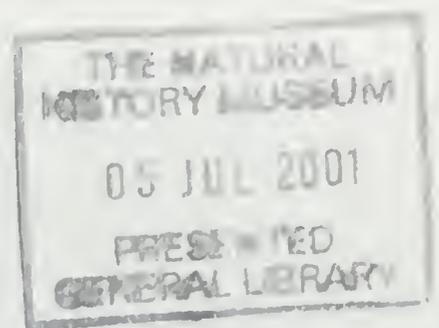
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THE SCOTTISH NATURALIST

Founded 1871

A Journal of Scottish Natural History

With which is incorporated *The Annals of Scottish Natural History*
and *The Western Naturalist*

109th Year 1997

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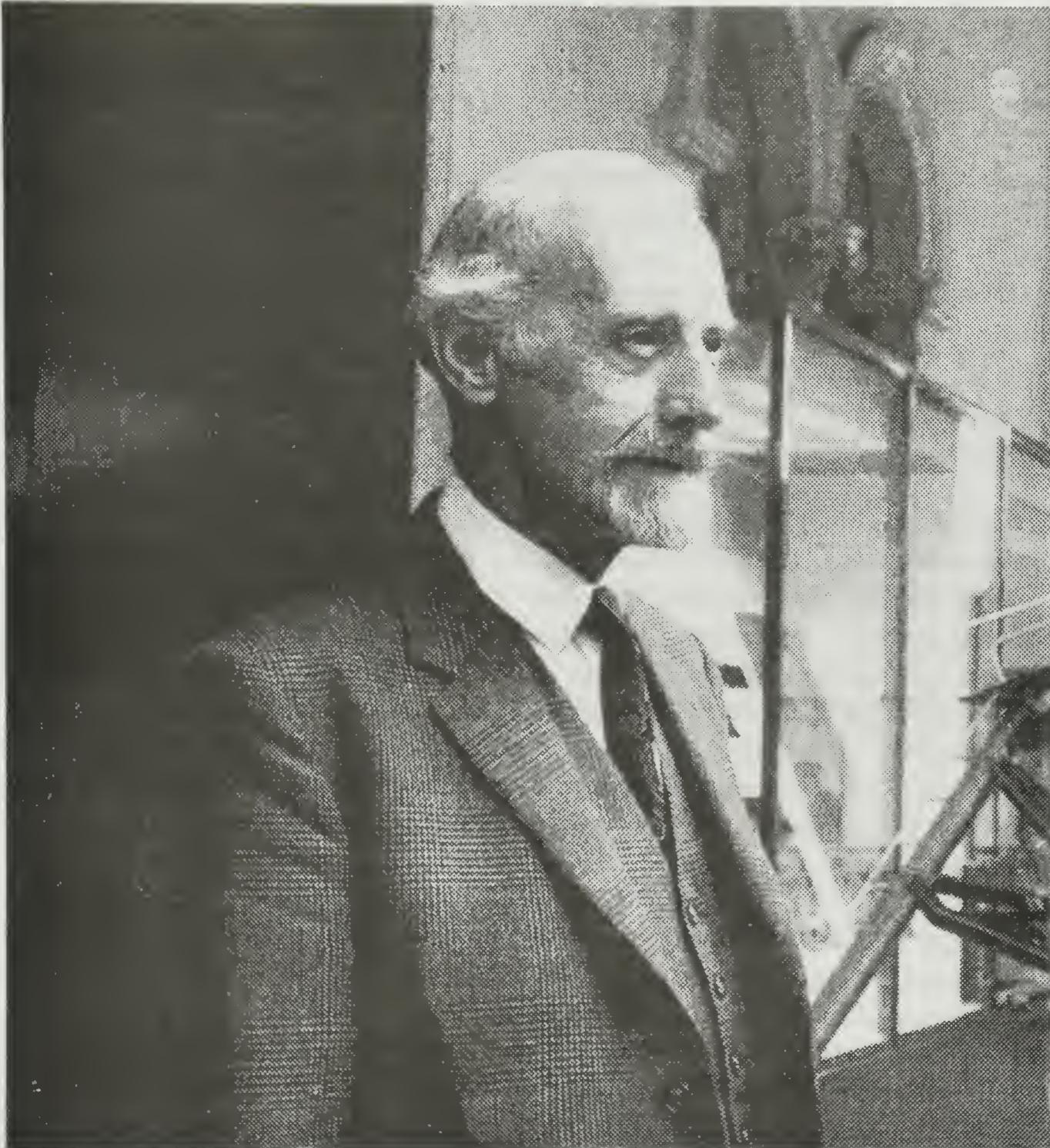
interests were sustained throughout his life and continued to be reflected in some of his scientific publications.

With several others who were to go on to develop notable careers in biology, including Marie Elizabeth Campbell, whom he was to marry in 1938, Rodger participated in Edinburgh University Biological Society's classic 1935 scientific expedition to survey and record the fauna of Barra, thus starting a lifelong association with the Outer Hebrides which included living for sizeable parts of the last 30 years on Barra, and making major studies of the fauna of those islands.

At the outbreak of the Second World War, Waterston was seconded to the Ministry of War Transport as district transport officer for Clydeside until 1942. He was based in Paisley, and while there in his spare time he examined and rearranged the important entomological collections in Paisley Museum made by the late Morris Young, one of Scotland's earliest pioneer entomologists and founder of the Renfrewshire Natural History Society in 1847. Morris Young's collections had been considerably neglected, and it was almost entirely due to Waterston's timely intervention that many of the specimens were saved. The Waterston family originally came from Renfrewshire, at Waterstone near Johnstone, and in 1970, when Rodger returned to Paisley to deliver the Morris Young Memorial Lecture to the Renfrewshire Natural History Society, he also had the great pleasure of making a sentimental journey to Waterstone farm, the home of his forefathers.

In 1942 Rodger served with the Royal Scots for a year, but during the war his recognised ability in entomological research caused him to be transferred from the Royal Scots to the Colonial Office's Middle East Supply Centre in Cairo in autumn 1943, as Locust Officer in the Middle East Anti-Locust Unit, and later he took charge of the Palestine Anti-Locust Unit in Saudi Arabia.

The need for locust control did not end with the war, and he stayed on, travelling widely in the Middle East, India and north-east Africa to construct the framework which was necessary to monitor and control such an erratic and explosive pest. In 1947 he eventually took charge of all locust control and became Entomological Adviser and Attaché for Scientific Affairs at the British Embassies throughout the Middle East. Waterston's success in the Middle East, which required technical cooperation and coordination across some very difficult international frontiers, and for which he was awarded the O.B.E. in 1952, was a tribute to his personal qualities of patience, tact, integrity, and dignity, which distinguished him all his life.



Rodger Waterston

Royal Scottish Museum, January 1970

Rodger Waterston returned to the Royal Scottish Museum in 1952, becoming Keeper of Natural History in 1958 until he retired in 1973, then being retained as Keeper Emeritus in a research capacity until he finally retired in 1977, although he continued to visit the Museum regularly, where his depth of knowledge and phenomenal power of recall were of immense value to younger colleagues. His association with the Royal Scottish Museum therefore spanned sixty years, officially from 1935 to 1977 and unofficially until just before his death.

It was a good period not just for entomology, but for zoology as a whole in the Museum. Waterston developed the collections, secured a number of important donations and bequests, improved their accessibility and exhibition, and brought to the Natural History Department several new staff who gave distinguished service; it is to Rodger Waterston's time that the current operation is largely traceable.

Rodger redirected much of his own entomological research interest from Hymenoptera and Hemiptera, which he had collected extensively in pre-war days, to Odonata and Neuroptera in response to a major bequest, the Kenneth Morton collection, which had come to the Museum during the war years and which both needed and merited extensive curatorial work. He took great advantage of the willing entomological contacts made overseas to collect specimens to develop these collections further, and published particularly on dragonflies, especially those of the Middle East, finding the time to do so largely after his retirement. Other important publications during this time were on the fauna and ecology of the Outer Hebrides.

Rodger was one of the founders of the Scottish Natural History Library as the national collection of Scottish natural history books and journals, and it was largely due to his efforts that the Library received both the library of the Royal Physical Society of Edinburgh and the natural history holdings of the Royal Society of Edinburgh some ten years ago. As a co-editor of the *Scottish Naturalist* from before the war and again from 1983, he was greatly involved in setting high editorial standards, and gave enormous help and advice to authors over the presentation of their research. He also did much as an advisory referee to help the Curwen Press and subsequently Harley Books to achieve their exceptional standards in entomological publication.

Although modest by nature, Rodger was blessed with a superb memory and an eye for detail, and was an excellent raconteur with a nicely dry sense of humour; an evening spent in his company could be a memorable occasion. With his great height and naturally dignified bearing he was a kenspeckle figure, always immaculately dressed in a faultlessly-cut three-piece tweed suit, regardless of the

weather, and in every respect was "a gentleman and a scholar" in that best of all the old Scottish traditions. His wide intellectual interests, sound judgement, and gentle nature meant that he was held in universal respect, and in this age of increasingly narrow specialisation it can probably never be more true, to use the old phrase, that we shall never see his like again. To have known Rodger as a colleague and a friend was a truly rewarding and enriching experience, and a generation of scientists in many parts of the world will remember with gratitude the patient and generous help he was always so ready to give them with their work; no-one who approached him for advice ever went away empty-handed.

Rodger is survived by his wife Marie and their daughter Susan, with whom we deeply sympathise in their great loss. The excellence of Rodger's life-work, however, is indelibly embedded in the zoological collections of the National Museums of Scotland, and through these we shall all continue to respect and enjoy Rodger as a gifted naturalist and scientist.

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Rodger Waterston's personal scientific publications therefore extended over sixty years, but in addition, of course, there were many editorials, comments, reviews, introductions &c, and numerous revisions of papers and books for which he acted as referee.

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THE LOCH LOMONDSIDE BEAVERS

By PATRICK TELFER SMOLLETT

Cameron, Alexandria

Introduction

In the autumn of 1995 four Beavers escaped from their enclosure in the grounds of my home at Cameron Farm Estate. One was accidentally killed and two others were eventually recaptured and returned to their enclosure, but before that happened, fanciful accounts unfortunately appeared in the public press, which suggested that Beavers might be breeding on Loch Lomondside, and there was even the hilarious suggestion that one might have crossed the Atlantic! (Anon, 1996a and 1996b; McBeth, 1996a and 1996b; Seenan, 1996; Smith, 1996; Temple, 1996).

In order to dismiss these absurd rumours once and for all, Dr. J.A. Gibson, West of Scotland Recorder for the Mammal Society of the British Isles, suggested that, for future reference, I should put the correct facts on permanent record in the national journal, the *Scottish Naturalist*. This I am glad to do, and the details of the short history of the Loch Lomondside Beaver colony are as follows:

History of the Loch Lomondside Beavers

In 1985 I introduced two Canadian Beavers *Castor canadensis*, one male and one female, to the Cameron House Wildlife Park, which I had originally established in 1972. While they were in the Wildlife Park they did not breed - possibly because of too much disturbance - so when the Wildlife Park closed in 1987, I brought both Beavers across to a pond and enclosure specially created for them in a quiet area of the grounds of Cameron Estate Farm at the south-east part of Loch Lomond.

Breeding success was almost immediate in the Beavers' new home, with viable young produced during the first year, and successful breeding continued thereafter, so that, with a few deaths, apparently from old age, there were eleven animals present by 1993. With the later deaths of further animals, again apparently from old age, and new young being born, this remained the total for the next two years.

In late autumn 1995, however, a corner of the enclosure got damaged and, as was later ascertained, four animals escaped. At the time we could not be quite certain how many Beavers had escaped and how many were still present, since at that time of the year the Beavers' reduced visible activity made numbers quite difficult to assess.

Information about the subsequent fate of the escapees gradually emerged over the next six months or so, and the known details are as indicated below.

Fate of Escapes

The first information was when one was killed by a car on the road through Glen Falloch in January 1996. The body of the animal was subsequently returned to the Estate.

Two more must have made their way down the River Leven, for one was found in an exhausted condition by children playing in the snow at Bonhill, near Alexandria, on 7th February 1996. The animal was taken to Hessilhead Wildlife Rescue Centre at Beith, Ayrshire, from where I later collected it and returned it to the enclosure.

Reports by children of "several more" being seen in the area are unlikely to be true and can probably be attributed to the usual excitement which so often follows the discovery of some exotic animal escape. Similar criticism applies to the so-called 'wildlife experts' who speculated that Beavers might now be breeding in the wild at Loch Lomond, and it is perhaps fortunate that these unnamed 'wildlife experts' continued to remain anonymous (Anon., 1996a and 1966b; Smith, 1996; Temple, 1996).

The third Beaver seems to have fended for itself quite well, and was actually found wandering in King Street, Port Glasgow, Renfrewshire in the early hours of the morning of 2nd May 1996, and its discovery at first actually led to the extravagant speculation that it might have stowed away on a ship and so crossed the Atlantic! Fortunately common sense soon prevailed (McBeth, 1996a and 1996b; Seenan, 1996). The animal was collected by my gamekeeper and also returned to the enclosure.

At the time of writing (December 1996) the fate of the fourth animal is still unknown.

Other West of Scotland Beavers

There have been at least two previous attempts to introduce Beavers, or keep them in semi-captivity, in the West of Scotland, by the Third Marquess of Bute to the Island of Bute in the 1870s (Gibson, 1980) and by the Ninth Duke of Argyll to Inveraray district in the early 1900s (Gibson, 1976). The Bute experiment survived for some 20 years, but little more was heard about the Inveraray introduction.

Present State of Loch Lomond Colony

Out of the eleven animals originally present in 1995, three Beavers died, again apparently of old age, and four escaped, with two being subsequently returned, thus bringing the number in the colony to six animals. We sold two of these, one male and one female, to a collection on the Isle of Man at the end of October 1996, and intend to replace these two animals with fresh stock in 1997, to improve breeding success. This remains the position at present.

Conclusion

It is a pity that exotic animals cannot apparently escape from local collections and subsequently be 'discovered' without nonsensical reports appearing in even the more respectable newspapers, but, as far as the local Beavers are concerned, hopefully these brief notes on the history of the Loch Lomondside Beaver colony will put the present record straight.

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Editorial Note

Most unfortunately, Major Patrick Telfer Smollett died suddenly at the end of March 1997, not long after he had checked the proofs of this short Beaver history. At present it is not known what is going to happen to the Loch Lomondside Beaver colony.

*Major Patrick Telfer Smollett,
Cameron Estate Farm, by ALEXANDRIA, Dunbartonshire.*

THE ROMAN FORT ON WHITEMOSS FARM, BISHOPTON, RENFREWSHIRE

Part 1: The Excavations of 1950-1954 and 1957

By FRANK NEWALL

Renfrewshire Natural History Society

Introduction

Following two seasons on the Field School of Archaeology site at Milton, under John Clarke's supervision, reinforced by excavations at Duntocher then being directed by Miss (later Professor) Anne S. Robertson, John Clarke suggested that the writer commence trial trenching at the newly discovered Roman fort (Steer, 1951) on Whitemoss Farm, Bishopton. Excavations continued seasonally until 1954 with the full support of Mr. Clarke and Miss Robertson. In them were my beginnings; to them I willingly dedicate this long overdue report.

The excavations were conducted on behalf of, and funded by, Glasgow Archaeological Society and Glasgow University where, in the Hunterian Museum, the finds, find-books, site note-books and photographs are retained.

Further grants to cover the expenses of students and senior Grammar School pupils were received from Renfrewshire Educational Trust.

A final season's work was conducted by the late Professor Stuart Piggott, who supervised the excavation of Neolithic features (Piggott, 1957), with the writer being responsible for the Roman levels.

The bulk of this report is as written in 1955, but the renewal of interest in the site in 1957, when area excavation (Piggott, 1957: 25) replaced selective trenching, allowed a more detailed examination of the western rooms of the barracks and stables.

Finally, the results of excavations in 1970 at Outerwards (Newall, 1976) and in 1971 at Martin Glen (Newall and Newall, 1980) led to a reinterpretation of the areas of 'char' located in the ungraded lower depths of the site, and to a consequent adjustment of the dating.

The Site, NS 417721 (Figure 1)

The fort commands the Dumbuck ford (Williamson, 1856: map) where a Roman crossing of the Clyde has been confirmed (Newall and Lonie, 1990: 28; 1992: 16). This not only allowed cover of the Leven gap but communicated with the fort at Old Kilpatrick (Miller, 1928: 7-9; Macdonald, 1932: 232, 239-241).

To north and south-west the ground falls steeply. The west side is protected by a basalt escarpment, the north-east corner by an abrupt partly scarped declivity, but on the east and south-east the ground is level, a weakness acknowledged by the fort defences.

To the west the fort is blind landward, but to the east are visible the fort sites of Old Kilpatrick, Duntocher and Castlehill.

Within, it measures 416 feet (126.8 m) N-S by 444 feet (135.34 m). The area, 4.24 acres (1.72 ha) is little more than the 4.14 acres (1.68 ha) at Old Kilpatrick (Miller, 1928: 2), and second on the Antonine frontier only to Mumrills (Macdonald, 1929: 406) which exceeded 6.5 acres (2.63 ha).

The North Defences

The north side is covered by a 20 feet (6.1 m) wide turf rampart separated from a single ditch by a berm 4.0-6.0 feet (1.2-1.8 m) wide. East of the central entrance gap, 38 feet (11.58 m) wide, the ditch has a V-profile 12 feet (3.66 m) wide, but to the west is at least 16 feet (4.88 m) wide. For its greater length to the east the scarp is the modified face of basalt outcrop, the counterscarp having been dug through a detritus of rock splinters and till to a depth of 5.0 feet (1.53 m).

From the entrance, a road turned towards the Dumbuck crossing (Newall and Lonie, 1990: 28; 1992: 16). Over a depth of small metal on cobbles, two layers of brown gravel sandwiched a rougher dark gravel. Above, a further spread of dark gravel under light gravel flanked a final 12 feet (3.66 m) wide road. Three road surfaces are represented.

The rampart of laminated turf was oversailed at the rear by the cobbled base for an earth bank (see Clarke, 1933: 13-16; Macdonald, 1933: 286-296), with a cobbled extension. The main cobbling varied from 8.0 feet (2.44 m) to 9 feet 6 inches (2.89 m), but a constant overall width of 12 feet (3.66 m) persisted. Beneath lay occupation earth over primary dark gravel. At one point the cobbling

partly overlay the ashes of a circular hearth, beneath and beyond the limits of which extended an earlier hearth.

The rampart lay on an earlier mound hollowed to receive it. This varied from brown earth and stones to red clay. At no point did it extend far beyond the south edge of the rampart.

East of the entrance by 22 feet (6.67 m) the ditch contained, over 6.0 inches (16 cm) of silt, two spreads of red clay or daub with but a smear of silt between. Neither reached the ditch sides, and were probably a slow drift from the roadside discharge drain which itself contained burnt wood. Embedded partly in the silt and partly in the daub, which had flowed round and over them, were fragments of a platter, DR31R (Hunterian Museum, 1950: 168-170). Further silting covered all. An overflow drain discharged from the ditch end.

At the north-east corner the ditch, here of Punic profile, was 14 feet (4.27 m) wide, but the outer 4.0 feet (1.22 m) was a shelf 2.0 feet (0.61 m) deep. As it turned the north-east corner, the ditch resumed the V-profile and the width increased to 18 feet (5.49 m), the shelf to 6 feet 6 inches (1.98 m).

The bottom silt was overlaid with burnt clay mingled with unburnt yellow clay, possibly rampart turf, all covered by some 3.0-4.0 inches (7.6-10.1 cm) of carbonaceous soil developed from the dissolution of charred wood drifting from the berm. The depth suggests a slow lengthy accumulation. Above lay 8.0 inches (20.2 cm) of silt.

An intermediate section revealed no stratification. The scarp had been resurfaced with clay which, towards the bottom, sealed a thin residue of silt. Here the turf rampart had been replaced by darker more peaty material. Possibly, then, the ditch had been cleaned out at this point following rampart collapse. We may equate the suggestion of decay in this section with the traces of destruction in others, and infer a lengthy period of abandonment at the close of a penultimate period which ended in destruction.

Some 80 feet (24.39 m) from the north-west corner the sub-rampart mound was modified to receive a step of heavy cobbles. Further stepping may have carried the rampart towards the corner, a rocky knoll where the west rampart is based 5.0 feet (1.5 m) higher than the north. The west ditch tapers off 6.0-7.0 feet (1.8-2.19 m) above the north ditch which ceases abruptly against the rock face.

How the rampart tops were bonded is problematical. As the rampart is 16 feet (4.88 m) wide on the other three sides of the fort, it may be that the north rampart

Figure 1

Opposite; facing page 58.

**The Roman Fort on Whitemoss Farm,
Bishopton, Renfrewshire**

was based 4.0 feet (1.22 m) wider to allow an increase in height, thus ensuring a level rampart walk.

The West Defences

Along the intractable basalt north of the west gate, the builders dispensed with a ditch proper but outlined a trench 10-17 feet (3.05-5.18 m) broad and, except for a short central length, only 1.0 foot 6 inches (0.46 m) deep. The long counterscarp was the exposed surface of the eastward sloping rock, the scarp a short steep cut through till and an upper brown clay layer, possibly of the sub-rampart mound.

South of a 21 feet (6.4 m) wide entrance the broad rock-hewn ditch divided. The counterscarp, 3 feet 6 inches (1.07 m) lower than the almost vertical scarp at the terminal, approached it in level as it adopted a broad shelf which deepened and separated from it as an independent outer ditch, reflecting the procedure at the north-east corner. Rock dictated a varying profile, and in some sections both sides fell vertically to a rough bottom.

The South Defences

West of the south entrance are four ditches, to the east five, designated A to E on the plan (Figure 1). A and B, 12-14 feet (3.7-4.3 m) apart, ending separately west of the entrance but in a composite terminal to the east, are the original fort ditches. Their respective entrance gaps measure 21 feet (6.4 m) and 36 feet (10.97 m). In rock - to the west - the inner varies from 8 feet 6 inches (2.59 m) to 11 feet (3.35 m) and falls to a flat bottom 4 feet 6 inches (1.37 m) deep. In till it is 11 feet (3.35 m) wide and V-shaped. The outer is 12 feet (3.68 m) wide, also flat bottomed in rock, and 3.0-4.0 feet (0.9-1.2 m) deep.

C, 21 feet (6.4 m) from B on average, perpetuates an earlier system. Sinuous, irregular, originally flat bottomed and at deepest 3.0 feet (0.9 m), it passed before the south gate but had an 8 feet 6 inches (2.59 m) wide entrance gap 120 feet (36.58 m) to the east. To the west, and before the gateway, it had been filled with earth over from a mere trace to almost 1.0 foot (0.3 m) of silt, but to the east it had been deepened and incorporated in the fort defences, joining with A-B in a triple terminal.

About 100 feet (30.48 m) west of the south gate, C was equipped on the scarp with a shallow palisade shelf and on the outer edge with a concave shelf, the total width being 22 feet (6.67 m). Towards the gateway, as the outer shelf disappeared, the scarp shelf correspondingly widened. Over rock to the west the

stake holes in the scarp shelf petered out as it was replaced by a ridge of heavy stones which continued westward to the edge of the basalt escarpment where the ditch ceased.

Before the gate, stiff clay filling carried the sunken remains of a road over C towards the gap in D, possibly on its way to sites downriver, while a road exhibiting two layers of small cobbles inclined eastwards alongside the triple A-B-C terminal, doubtless aiming to join the main trunk road from the south (Newall and Lonie, 1992: 16).

To the west, a drift of clay from a mound south of C, probably upcast from D, overlay the C filling, but east of the gateway spilled down the recut side of C.

D lies 46 feet (14.02 m) from B and 9-12 feet (2.7-3.7 m) from C, with a 14 feet (4.27 m) gap fronting the south gate of the fort. Its length east of the gap does not align with that to the west, nor is there exact correspondence of the terminals. Strict alignment would have closed on E, which lies 28 feet (8.54 m) south of C to cover its entrance gap.

In a final phase, a transverse ditch 12-15 feet (3.7-4.6 m) wide by 5 feet 6 inches (1.68 m) deep was cut through the triple terminal, fortunately leaving evidence of the previous junction. A parallel transverse cut, 76 feet (23.17 m) to the east, completed an enclosure bounded by these ditches on east and west and by B and E, here 20 feet (6.1 m) wide. The lengths of C and D enclosed were filled solidly.

The recut C is 15 feet (4.58 m) by 5 feet 9 inches (1.75 m) deep. Down the north side, and reaching the bottom as puddled yellow clay, was a slip from a low mound to the north, probably resulting from the recutting of C itself. Over this, dark silt filled the bottom 2.0 feet (0.61 m).

Down the south side a dark earth drift supporting a 1.0 inch (2.55 cm) thick band of vegetation had merged with and assisted in the accumulation of the upper levels of the silt. This probably derived from the cutting of D, prior to which at least 1.0 foot (0.31 m) of silt had formed. This, however, was displaced by boulders thrown in to consolidate the fill of rammed clay, stones, charred wood, bunt daub, tiles, brick and potsherds.

D held some 6.0-9.0 inches (15.15 - 22.75 cm) of silt, above which the fill was similar to that of C. The difference in silt depths confirms the relative dating of C and D, but relative duration cannot be assessed due to the disturbance by the fill.

The compacted material implies foundation for a not inconsiderable superstructure. In both ditches the top layer was hard beaten clay. This ceased 6.0 feet (1.83 m) short of the transverse ditches against which the C-D fill was of heavy laid stones from top to bottom. From the upper 2.0 feet (0.61 m) of silt in the west transverse came several dressed freestone blocks, hence a stone wall or sill may have rested on the 6.0 feet (1.87 m) wide stone fill.

That the packing of C-D was damaged site debris is patent, hence we conclude that the enclosure was being formed while the fort was being cleared for further occupation. It is possible that it housed an extra-mural bath house, as at Balmuildy (Miller, 1922: 47-55).

Near the south-east corner of the enclosure, E had inserted into the counterscarp, and extending 4.0 feet (1.22 m) into the ditch, an 8.0 feet (2.44 m) wide bridge pier of reused stone and tiles facing a band of clay and cobbles along the scarp edge.

East of the enclosure, D terminates in a loop which closes the gap with C, but continuing its straight alignment eastward was a mound at least 14 feet (4.27 m) wide. The north 8.0 feet (2.44 m) of weather boarded laminated turf, as evidenced by a thin black line fronting the base, had a batter of 70 degrees. South of the turf, the mound was of clay and earth which passed under the farm track. Plough-disturbed clay and earth was located 125 feet (38.1 m) to the east, but no continuity was established.

Beneath the mound, stake holes, 4.0 inches (10.1 cm) in diameter by 1.0 foot (0.3 m) deep, were arranged in six rows, 4.0 feet (1.22 m) apart transversely and 2.0 feet (0.61 m) longitudinally, suggestive of a barrier 19 feet 6 inches (5.95 m) wide, the north 7.0 feet (2.12 m) lying to the north of the turf mound. No ditch was found in association, but the replacement of palisade by mound may indicate a persistent interest in the site, perhaps by reconnaissance parties.

The Sub-Rampart Mound

The 16 feet (4.88 m) wide south rampart bordered a berm, which narrowed from 17 feet (5.18 m) at the south-west to 11 feet (3.35 m) at the south-east corner. Behind, the rampart earth bank cobbles 9.0 feet (2.7 m) wide had a 5.0 feet (1.53 m) extension.

The pre-rampart mound of till and red clay was 14 feet (4.27 m) wide by 1.0 foot 6 inches (0.46 m) high. About 100 feet (30.48 m) west of the gate its forward

edge lay 8.0 feet (2.44 m) north of the inner ditch, A, the rampart resting on the rear 6.0 feet (1.83 m), but at the gate it fronted the rampart, coincided at front with the inner ditch edge and passed unbroken across the entrance. There the subsoil had been excavated 1.0 foot (0.3 m) deep to retain its forward edge, 2.0 feet (0.65 m) behind which vertical posts only 4.0 inches (10.1 cm) in diameter had been driven.

At the south-east corner the mound, of clay and turf, still set at front in a 1.0 foot (0.3 m) deep hollow with at least one post near the front, now lay between ditches A-B. A had removed the rear edge. Through the mound passed a simple V-shaped drain with traces of wood. Although not strictly aligned with the main drain of the fort, if extended north it would have joined it.

The East Defences

Ditches A and B continue round the east side, the inner as far as the Old Glasgow-Greenock road which overlies the east gate of the fort. The outer ceased 110 feet (33.53 m) to the south, where it was 2.0 feet (0.61 m) deep with a flat rock bottom. It ended as it passed through a deep hollow which had been cleaned out and packed with clay and boulders to form a false outer edge. Just before this point the ditch held three levels of silt separated by 1.0 inch (2.55 cm) thick black vegetation bands. Cross-sectional areas provided a secondary to primary ratio of 1.55: 1.0.

Ditch C rounded the corner in a shallow extension. On the east it was filled over 3.0 inches (7.6 cm) of silt, with cobbles in sand. It stopped 180 feet (54.87 m) south of the old road in a hooked end, possibly due to the hollow which was modified to accommodate B. Some distance beyond this, however, the ground falls steeply beneath the edge of the farm track.

It is possible that this is the edge of C, continued beyond the wet hollow to close with the fort ditch as the outer ledge located at the north-east corner. An aerial photograph hints at its presence in the field to the east close to this point.

Pre-Fort Activity

The sub-rampart mound corresponds closely with the fort rampart on north, east and west. Its divergence on the south side focuses attention on the extensive marshy hollow on the south-east, much of which was enclosed by the fort rampart. This involved the digging of a deep drainage sump and of the main drain of the fort before its defences could be completed (see Topography, later).

Within the fort, especially on the south-east, builders' levels have been recognised and pre-garrison foundations located to the east of the headquarters building. Hence we may recognise in the earlier features the semi-permanent perimeter of a construction camp.

It is probable that the fort ditches on north and north-east adopted camp defences. Ditch C would continue the circuit, leaving room for fort ditches A and B. The camp had its own gate, to the east of the later fort entrance, covered by the short ditch E. One is reminded of the early mound and ditch at Old Kilpatrick (Miller, 1928: 10-13), but if the ditch there was strictly analogous with Whitemoss C, the implied enclosure may lie to the east.

Finally, the traces of clay and turf to the south-east might indicate an annexe to the earlier camp.

The South Gate

The south gate was 10 feet 6 inches (3.2 m) wide between three post holes on each side, 4 feet 6 inches (1.37 m) apart and 3.0 feet (0.92 m) from the rear and 4.0 feet (1.22 m) from the front of the rampart. The 2.0 feet (0.51 m) diameter post pits had secured 10 inch (25.28 cm) posts resting on flat stones. The depth, 1.0 foot 6 inches (0.46 m), was increased to just over 2.0 feet (0.61 m) by additional street levelling which sealed burnt wood, nails and a red mortarium rim (Hunterian Museum, 1951: 102).

Unusual were two post holes driven at an angle of 45-55 degrees. Just over 8.0 inches (20 cm) across, they lay 2.0 feet (0.61 m) in front of the gate-post holes such that struts from them would have passed up the sides of the entrance passage. While these may have been used in the erection of the gate, one might have expected a more oblique angle for sheer legs.

A strut projected at 55 degrees would have reached the central post 9 feet 6 inches (2.9 m) from the ground; at 45 degrees, the rear post at 11 feet 6 inches (3.5 m). The rampart may, therefore, have been 9 feet 6 inches (2.9-3.51 m) high. Cross beams to support rampart walk and tower flooring would have raised it by 6.0 inches (15.15 cm).

About 12 feet (7.66 m) was suggested for the height of the slightly wider Fendoch rampart (Richmond, McIntyre *et al.*, 1939: 113) and about 10 feet (3.05 m) for the narrower Antonine Wall (Macdonald, 1934: 88). A batter of 70 degrees before, and 75 degrees behind, the rampart is indicated.

Within and around several of the final post holes were the remains of wooden pegs (?), 1.0-1.5 inches (2.5-3.8 cm) in diameter. Whatever their purpose, they could only have been found *in situ* if the gate posts had been removed bodily. Nails, twisted and broken, lay around, but there was no trace of burnt material.

The Fort Interior

TOPOGRAPHY

The fort occupies a plateau hollowed between overlapping crag and tail basalt sills. To the west is the escarpment which protects the fort on that side. To the east, a corresponding sill outcrops as the scarp at the north-east corner, provides for some length the inner edge of the north ditch and, concealed underground, extends almost to the north-east corner of the headquarters building (Principia) as it turns to pass some 100 feet (340.48 m) north of the south-east corner of the fort. Concomitant with the edge is a hollow which continues under the east side of the Principia, under the south end of the granary, the east end of the stables and expands just clear of the barracks into the wide marshy hollow in the south-east.

Over this hollow, primary occupation mainly survives as the sleeper trenches which held wooden beams into which were mortised upright posts. Secondary buildings rose from post holes. This second period saw grading which, as at Old Kilpatrick, reduced sleeper trenches (Miller, 1928: 22) and revealed prehistoric occupation (Callander, 1929: 37) at Roman level in ground already reduced by the removal of turf for the fort rampart. Over the hollow, the surface was raised by the spread of a distinctive light yellow soil similar to the till subsoil.

In a final period, clay sills and ashlar and cobble piers provided foundations on a surface further raised by a deeper brown soil-spread, extensively cobbled.

The Principia (Figure 2)

The Principia was of normal plan, comprising a suite of offices on each side of the central shrine (Aedes). This was fronted by a Cross Hall beyond which lay the forecourt with its surrounding wing and front corridors.

The primary build was founded 1.5-2.0 feet (0.46-0.61 m) deeper on the east than at the Aedes. Secondary levelling reduced the maximum difference to 1.0 foot 6 inches (0.46 m), final levelling to 9-12 inches (22.75 - 30.8 cm). To the west, primary and secondary foundations were almost compacted, little below plough depth. Further, a slope reversal occurs along the rear of the cross hall. As

a result, at their junction with its north wall the lateral units have stepped foundations 9.0 inches (22.75 cm) deeper on the east, a mere 2.0-3.0 inches (5.1-7.6 cm) on the west.

Primary

Of the rear suite, one room 10 feet (3.05 m) by 16 feet (4.88m) lay at extreme west. Within it a sleeper trench 2.0 feet 6 inches (0.77 m) from and parallel to its east wall changed direction to run to the north-east corner. The diagonal stretch held the remains of a charred beam.

No further divisions were identified, although entrance gaps lay on each side of the Aedes. However, a sleeper trench 2.0 feet (0.61 m) from the east wall extended into the Cross Hall. To the north a short length ran at right angles to it. If these partly outlined the Tribunal, it was at least 10 feet (3.05 m) wide. These trenches contained charred timber and were not reused.

The Cross Hall was 17 feet (5.18 m) wide and the Courtyard was surrounded by corridors 11 feet (3.35 m) wide on the west, 9 feet 6 inches (2.7 m) in front, and 9.0 feet (2.75 m) on the east. The south end of this last corridor was closed but the west corridor opened to the Cross Hall. The front corridor alone was gravelled.

Centrally in the Cross Hall, midway between the entrances to Aedes and Courtyard, was a depression 3.0 feet 6 inches (1.07 m) N-S by at least 3.0 feet 6 inches (1.07 m) and 4.5 inches (11.4 cm) deep. Packed with cobbles, this suggested a base to support some object of significance.

At Old Kilpatrick a circular depression just outside the access to the Cross Hall from the Courtyard, and surrounded by four post holes, was interpreted as an altar base within a canopy (Miller, 1928: 24). At Rough Castle the fragments of an inscription (Collingwood and Wright, 1965: R. I. B. 2145; Collingwood and Wright is hereafter referred to as R. I. B.) were found in a hole in the outer courtyard (Macdonald, 1934: 228). A statue fronted the Aedes at Stockstadt, statue bases flanked its entrance at Brough-by-Bainbridge, and the entrance to the Cross Hall at Risingham (Johnson, 1983: 111).

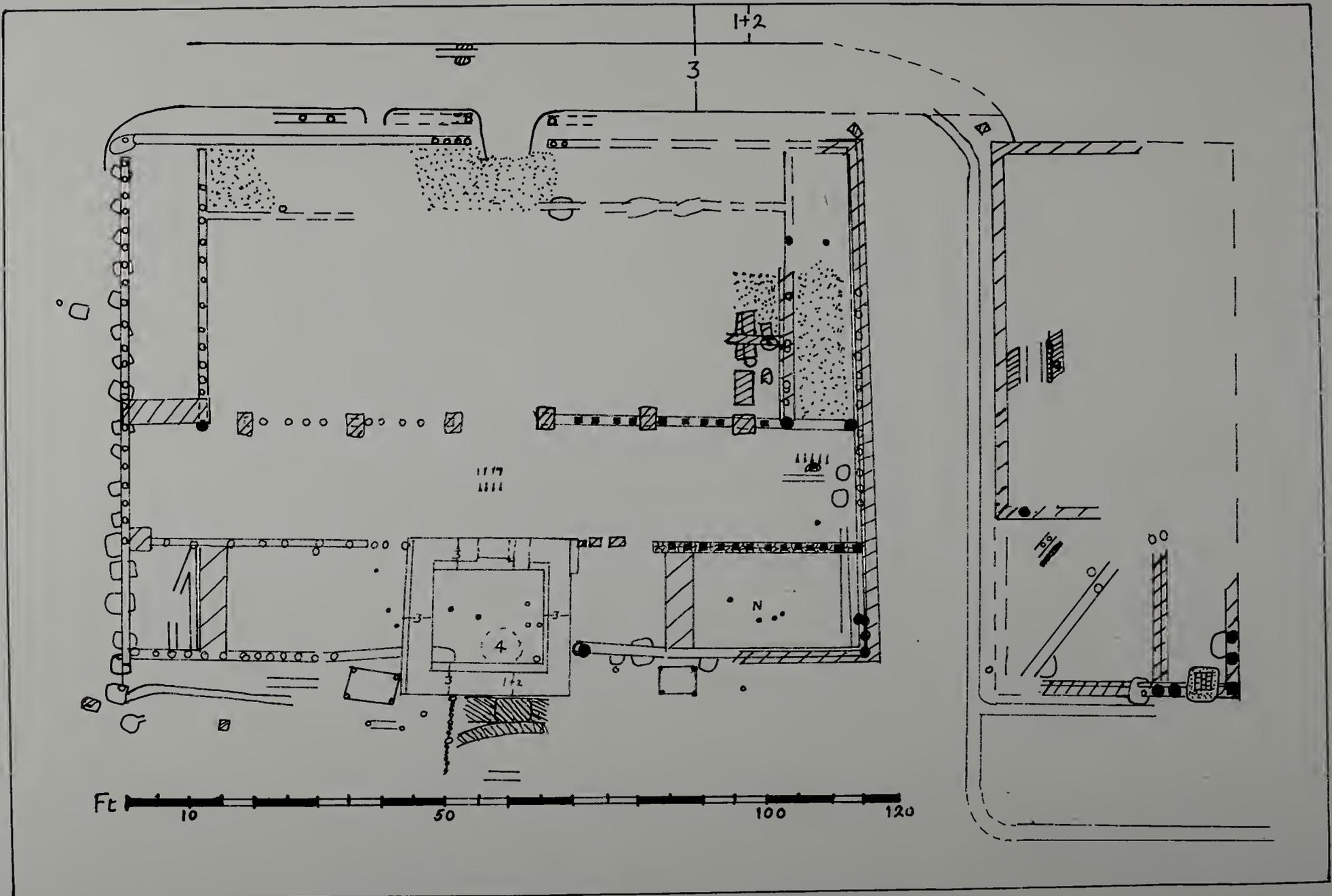
The deepest sleeper trench carried the division between Hall and Courtyard, intercommunication being provided by a 12 feet (3.06 m) wide central entrance gap and a 5.0 feet (1.53 m) wide access at the south-east corner. At some time the outer sleeper on the east had been packed solidly with clay, in which was the impression of a narrower beam.

Figure 2

Opposite; facing page 66.

The Principia and Granary

Third period foundations are hatched



In front of the Principia lay a verandah 4.0 feet (1.22 m) wide, with 14 feet (4.27 m) west of the main entrance a smaller opening 3.0 feet 6 inches (1.7 m) wide. The space between this and the main east-west street (Via Principalis), which lay 11 feet (3.35 m) from it, was gravelled. A trench along the south side of the street was shallow, and more like a sleeper trench than a drain, and in the second period held stones as though to pack post holes. It is possible, then, that an ambulatory fronted the Principia.

The foundation trench of the south wall deflected west of the Aedes to impinge upon it 6.0 feet (1.87 m) from the rear. In the angle thus formed lay a pit 7 feet 6 inches (2.29 m) by 4.0 feet 6 inches (1.37 m) by 2.0 feet (0.61 m) deep. In each corner a 6.0 inch (15.15 cm) post had been driven before the addition of 6.0 inches (15.15 cm) of clay facing to the sides and to the bottom. A similarly situated, similarly constructed pit, 6.0 feet 6 inches (1.98 m) by 4.0 feet 6 inches (1.37 m) by 2.0 feet (0.61 m) deep, lay to the east. Unexplained lengths of sleeper trench lay to the south. A lean-to may have enclosed the pits. A similar pit at Old Kilpatrick, of the same depth and floored with gravelled clay, was thought to have been used in two periods, the second of which produced a denarius of Faustina Senior (Miller, 1928: 26-27). At Whitemoss the pits were not reused.

Behind the Aedes was a freestone platform, 4.0 feet (1.22 m) wide by at least 7.0 feet (2.14 m) long. All round this, and a curving length of freestone kerbing before it, lay a levelling of crushed broken freestone preparatory for secondary building. With this freestone were associated freestone blocks from the larger, west, pit. This pit contained a 1.0 inch (2.55 cm) thick layer of charcoal over the clay floor, which was reddened patchily by heat. Silted charred wood remained in the corner post holes. Over further silted soil the pit was filled with destruction debris. Among sherds was a Samian platter DR 18/31 stamped VELOX F (Hunterian Museum, 1952: 102), but of interest were dressed freestone blocks averaging 9.0 inches (22.75 cm) by 7.0 inches (17.77 cm) by 4.0 inches (10.1 cm) and five voussoirs. The largest was 1.0 foot 4.0 inches (0.4 m) long and tapered from 8.0 inches (20.2 cm) to 4.75 inches (1.41 m), two c. 7.5 inches (19.05 cm) long tapered from 7.0 inches (17.77 cm) to 5.0 inches (12.62 cm), one 9.0 inches (22.75 cm) long tapered from 6.5 inches (16.43 cm) to 5.0 inches (12.62 cm), and the last 7.0 inches (17.77 cm) long tapered from 7.0 inches (17.77 cm) to 5.0 inches (12.62 cm). All were c. 4.0 inches (10.1 cm) thick.

The dimensions are patently not those encountered in major construction. Using the longest voussoir as a keystone, and arranging the others symmetrically around it, we may envisage an arch c. 2.0 feet 6 inches (0.77 m) wide. In view of the proximate platform, we conclude that we have the debris from a small shrine

(aedicula) perhaps containing an altar or a statuette, as attested near Castlecarry (R. I. B. 2148).

While pits and other features nearby might be referred to the fort construction party, their presence is clearly shown by a line of rectangular pits, each with a post hole in a corner, through which passed the west wall sleeper trench of the Principia. These pits probably founded the east wall of a long building (barracks?) perhaps longer than apparent, for other pits may lie beneath the streets. Similar pits beneath the rear suite and fore corridor did not hold posts, nor could they be related to a planned period.

Overall the Principia measured 116 feet (35.36 m) by 86 feet (26.21 m), or 90 feet (27.45 m) if the verandah is included. It closely resembles that at Mumrills (Macdonald, 1929: 421-30) which, including verandah, covers 11,900 square feet (1105.51 square m), close to Newstead's 11,972 square feet (1108.48 square m), but greater than Chester's 10,625 square feet (1010 square m) or Brecon Gaer's 1012 square feet (1114 square m). Excluding verandah, Whitemoss covers 9976 square feet (926.73 square m). Next on the Antonine frontier is Castlecarry's 8330 square feet (773.86 square m).

Secondary

As we have seen in the history of the defences and above, much preparation of a devastated site was required before re-occupation. Along the west side, reduction levelling had removed part of the sleeper trench of the front corridor, which was abandoned, the extant length retaining charred wood. Where walls were re-established, even where reduced, the sleeper trenches were cleaned out, had post holes dug through them, and were packed with stones including freestone, specially round the posts, and other occupation debris. Initially, until it was proved that a final period was based on clay sills, the different height of post holes and the different packing of freestone and natural stones round the posts had led us to believe that two periods of occupation were indicated. Evidence elsewhere, however, indicates that repairs were carried out during the second period of occupation. Here we see that lengths of the outer west wall were repaired.

The deeper east wing trenches, despite extensive traces of 'char' along each side, were packed with dark earth and stones, again including freestone. In contrast, the reduced front wall trench was accompanied by a slight mound of upcast till insufficient to have resulted from complete cutting, nor should it have survived secondary scouring.

In the rebuild, the Courtyard extended to the front wall, the verandah was reused, and the space between it and the main street was cobbled. Both wings opened onto the Hall, and main and subsidiary Courtyard entrances persisted.

Due to stepping, along the east wall of the Hall and south-east office, the sleeper trench was bottomed with flat stones such that posts had penetrated to a depth of 2.0 feet 6 inches (0.77 m) from the present surface, while those to the north of the Hall were 3.0 feet 9 inches (1.14 m) deep.

The offices east of the Aedes were now outlined by heavily constructed stone sills of broken freestone blocks, 2.0 feet (0.61 m) wide, containing posts 8.0 inches (10.2 cm) square, over stone-packed sleeper trenches. West of the Aedes, however, except for a length of rear foundation which was stepped up and held continuous freestone packing round post holes, all other foundations were of post holes driven through trenches packed with earth and stones.

In both periods the street to the south, the Via Quintana, lay c. 10 feet (3.05 m) to the south. Several post holes, two being incorporated in a minor cobbled sill running south from the Aedes, might hint at pent construction. Many associated sherds lay beneath the extended foundations of a third period Aedes.

The more solid rear foundations would not only support the reconstruction proffered for Fendoch (Richmond, McIntyre *et al.*, 1939: Figure 7) but indicate that offices and Hall were equally lofty. The deep sleeper trench fronting the Cross Hall was now packed with freestone and held 8.0 inch (10.2 cm) posts.

Third Period

Finally Via Principalis and Via Quintana reached the walls of the Principia. The entire east outer-end corridor walls now rested on clay and cobble sills, of which the outer one at the south-east corner and for some distance north did not align with the earlier foundation. The south-east corner secondary post holes were choked almost to bottom with burnt clay and daub, which lay around but was closely confined to this area and here compacted and covered by the clay and cobble sill. Only at this south-east corner did a tumble of stones suggest that sill walling may have rested on the clay sill. Clay continued over the twin post holes at the north-east corner of the Principia, but elsewhere the final period sills had been ploughed out. In this we were indeed fortunate, for, as we were informed by the proprietor, Mr. David Baird, due to the loss of shares against rock outcrop the entire area of the fort site was deliberately shallow ploughed. In this case, to have

removed the top foot of earth mechanically would have vandalised much of the site.

However, several exceptionally thick foundations survived. Within the rear suite, heavily cobbled clay sills, 4.0 feet (1.22 m) wide on the west and 5.0 feet (1.53 m) wide on the east, divided the respective areas into rooms, all 15 feet (4.58 m) N-S and from east to west 11 feet (3.35 m), 28 feet (8.54 m), 14 feet 6 inches (4.42 m) and 28 feet (8.54 m). The east rooms had cobbled floors, and that next to the Aedes was fronted by three small clay and cobble piers.

The west wing was now barred by a solid clay and cobble platform 4.0 feet (1.22 m) wide by 13 feet 6 inches (4.12 m), which overlay the ends of the primary sleeper trenches and at least two post holes of the inner and outer walls. In the south-west corner of the Hall a cobbled platform 3.0 feet (0.92 m) square led into the most westerly room, which may have had wooden flooring to accommodate the height of the sill. Step and larger sill suggest that the Tribunal now lay to the west.

The Cross Hall was now fronted by six ashlar and cobble bases averaging 3.0 feet (0.92 m) by 2.0 feet (0.61 m), three on each side of the entrance way, overlying the freestone packed sleeper trenches and post holes. The pier kerbs were of broken freestone. Doubtless they had supported the columns of a lofty structure.

The Aedes (Plate 1)

The Aedes was the only stone-built unit in the Principia and the probable source of reused freestone. Internally 18 feet (5.49 m) by 17 feet (5.18 m), it was founded primarily on cobbles rammed into a trench 3.0 feet 6 inches (1.07 m) wide by 6.0-9.0 inches (15.15-22.75 cm) deep, and levelled smoothly with clay. Separated from this by a thin spread of soil was a secondary course of flat cobbles 3.0 inches (7.6 cm) thick and of a width with the primary. Finally, over a further 4.0 inches (10.1 cm) of dark soil was a solid clay and cobble base, initially on east and west 4.0 inches (10.1 cm) narrower than the preceding, but extended externally by 9.0 inches (22.75 cm) of cobbling driven into the made-up soil.

Wider north and south walls reduced the interior to 17 feet (5.18 m) by 14 feet 6 inches (4.42 m). The south wall projected south, sealing secondary sherds, and was of double thickness, being of larger cobbles than the others. The north wall sill was of half thickness for a distance of 2.0 feet 6 inches (0.77 m) at the north-east corner, suggesting an off-centre entrance.



Plate 1

**Section of the east 'wall' of the Aedes,
showing three levels of foundation**

A large post hole in the south-east corner was silted up, while three minor post holes had secured some structure against the east wall.

Within lay the ashes of a cooking fire, probably from a demolition party.

The Courtyard Shrine (Plate 2)

In the south-east corner of the third period courtyard, an area 20 feet (6.1 m) N-S by at least 8 feet 6 inches (2.59 m) thickly floored with clay extended alongside the inner wing wall. In the flooring a shallow pit, 2.0 feet (0.61 m) in diameter, lay north of the most easterly pier fronting the Hall; it contained charcoal, pieces of bone, and droplets of lead which were also scattered round it, and had been immediately covered by a bench 8.0 feet N-S (2.44 m) by 1.0 foot 9 inches (0.54 m) mainly of clay but with a northerly 3.0 feet (0.92 m) length of compacted cobbles.

East of this bench, an annular pit was then dug 3.0 feet (0.92 m) in diameter, including an uncut central boss. The ring pit itself was 8.0 inches (10.2 cm) wide and 1.0 foot (0.31 m) deep. It had been filled with pure river-sand, some of which was scattered over the clay bench. The pit was then crossed by a clay bench or sill 4.0 feet (1.22 m) by 2.0 feet (0.61 m). This had been raised 4.0 inches (10.1 cm) above the pit when the burnt rib bones of a sheep or goat were left on it. It was then raised a further 2.0 inches (5.1 cm) when droplets of molten lead were scattered on the surface. Above, another fire was kindled leaving charred wood in the form of a black cross. All this was covered by a final thin spread of clay.

An east-west clay sill was then laid across the pit, possibly to support a screen which divided an enclosed shrine 11 feet (3.35 m) N-S from a gravelled fore area some 8.0 feet (2.44 m) long, which opened onto the cobbled courtyard and was contained by the north end of the west bench. The inner shrine had the clay bench along its west side and a small central clay platform which carried traces of burning including bone.

In the original hearth and bench we may read foundation sacrifice, followed by further ritual libation in the ring pit, and possibly further foundation sacrifice before the erection of the screen wall. The lead droplets may signify the 'sacrifice' of small cult objects.

Shrines within Principiae, but with less evidence of ritual, have been recorded (Johnson, 1983: 106-108).



Plate 2

The Courtyard Shrine

In the background (right) is the most easterly pier fronting the Cross Hall, and (left) the second period post-hole fronting the inner wall of the corridor, of which the third period clay sill has been largely removed to reveal the primary (sleeper trench) and secondary (post-hole) foundations. The stepping of these north of the Cross Hall is seen in the relative heights of the post-holes. The minor sill of the screen wall has been removed from above the annular pit.

The Granary (Figure 2)

East of the Principia lay a building 87 feet (26.52 m) by 37 feet (11.28m). The north end lay on the bare rock of the basalt sill, the south end over the adjacent hollow. At the north-west corner a traffic stop matched a similar stone pillar at the north-east corner of the Principia. South of this, vestiges of stone walling survived.

A section midway down the west side revealed at primary level a small stake hole, at secondary the clay bases of two dwarf walls, while in the final build a 2.0 feet (0.61 m) wide shelf of freestone flags laid on whin splinters accompanied the inner edge of the wall with, to the east, two clay dwarf wall sills above but not coincident with those of the previous period.

To the south a cross sleeper trench, at least on the west side, divided the greater length 56 feet (17.07 m) long of a granary underpinned by north-south dwarf walls, from two 'rooms' 26 feet (7.93 m) long by 25 feet (7.62 m) wide, on the west, and 10 feet (3.05 m) wide.

Within the wider room, underpinning was indicated by a diagonal sleeper trench which ran from the south-west corner towards the north-east. This was paralleled by a lesser slot with accompanying stake hole. While the alignment is unusual, diagonal beams survived at Walkenburg (Johnson, 1983: 98) and Heiderheim (Johnson, 1983: 175).

There was no indication that the lesser room to the east was separated from the main granary, nor that it was underpinned. A not dissimilar layout pertained at Weissenburg, where the lesser units were not buttressed (Johnson, 1983: 147). Perhaps we have one unit for heating the grain, the other for providing access.

It is possible that at Whitemoss the building was stepped at the cross division, and that to the north over rock the main building was largely supported on beams secured by raised stone sills.

To the south a thin smear of silt, along the beds of the sleeper trenches beneath filling, could only have resulted from seepage under beams and the passage of earthworms. The sides of all sleeper trenches had a thin irregular coating.

South of the cross division the secondary outer walls, like the division between Cross Hall and rear suite east of the Aedes, were secured in large post holes, at least one of which retained an 8.0 inch (20.2 cm) square outline, retained by a 2.0 feet (0.61 m) wide wall of clay-bonded freestone.

Three post holes in the east wall, just north of the south-east corner post, contained some 3.0 inches (7.6 cm) of dark earth beneath a filling of burnt wattle and daub which covered the surface, but to a limited extent, round them. This reflects precisely the situation at the south-east corner of the Principia. In each case it was patent that only by the removal of the posts could the daub have filled the holes almost to bottom. The presence of dark earth at bottom was a problem, and while these post holes seemed to point to deliberate removal of the uprights, the evidence from the south ditches and in the south-east corner (below) was of a site largely burned and considerably damaged.

Moreover, for there to have been so much burnt daub round the sockets it would appear that the walls had been burnt before the posts were removed. But if, indeed, there had been a desire to recover old timber, it would have been necessary to remove the lesser walling from the main posts, and reason would suggest that this should have been piled away from the desired posts if burning was necessary.

A common factor at both locations was that, despite a general clearance and levelling up, the third period sills lay on top of burnt material. We suggest that when debris was being cleared and the site levelled the stumps of burnt major posts remained above ground, that the third period builders prised them out, thus disturbing the post holes and allowing dark earth to fall in from the sides and round the top, that they then shovelled in and packed the daub lying around, and along the line of the wall consolidated it to provide a firm base for their own foundations. At the Principia the pink clay sill with traces of char and daub immediately beneath was initially recorded as slumped burnt walling. Only when the unburnt clay was traced further north clear of earlier deposits did we realise our mistake.

At the granary site, final period floors of clay were divided by a clay sill, and clay partly overlay the secondary east wall. An entrance to the lesser compartment comprised a 5.0 feet (1.5 m) platform of hard-packed cobbles as threshold. Over this, set in a thin spread of soil, was based a small step 2.0 feet 6 inches (0.77 m) by 2.0 feet (0.61 m) of well worn, re-used tiles.

The Commandant's House

The Commandant's House unfortunately shared with the north end of the Granary the basalt sill over which soil was thin. While the south-east corner, at least, of a primary build was recovered, limited by sleeper trenches, it was decided that much of the site would have been destroyed by the plough, so no further excavation was conducted.

The Barracks (Figure 3)

Work on the barracks was largely confined to the rear of the fort (Retentura). There in the south-east quarter a primary barrack block measured 154 feet (46.94 m) by 25 feet (7.62 m). Four internal sleeper trenches from the west outlined rooms 12 feet, 12 feet, 13 feet 6 inches and 12 feet 6 inches (3.66, 3.66, 4.12 and 3.81 m) wide. The next division located lay 54 feet (16.46 m) to the east, leaving space for four rooms 13 feet 6 inches (4.12 m) wide, of which the shallower internal divisions were probably erased by secondary levelling. Further reduced trenches outlined rooms 12 feet 6 inches, 13 feet 6 inches and 17 feet (3.18, 4.12 and 5.18 m) wide. The final internal trench on the east, and a length dividing the north end of the most westerly room, were shallow slots packed with yellow clay containing stake holes. These were minor divisions. It follows that the officers' suite embraced the two most easterly rooms and probably a third, for the third internal sleeper trench from the east was deeper than any other division, and the third room had a short length of trench in the north-east corner.

The most westerly room was not only subdivided, but had entrances on north and south. Not a normal barrack room; it may have been for storage (for harness?).

Except for the extreme west entrance, the south wall was linear. The north wall was of at least five lengths not strictly aligned and with entrance gaps facing a building 25 feet (7.62 m) to the north across a lightly metalled area. No street had been laid.

Whether we grant two or three rooms to the officers, we are dealing with a cavalry barracks, hence the building to the north was for stabling and the space between allowed ample room for assembling and walking horses. The entrances to the buildings faced this space. The area of the men's rooms (contubernia), at 12 feet 6 inches (3.81 m) by 24 feet (7.32 m) minimum, matches those of Gelligaer and Chesters, and at maximum exceeds them and those at Benwell. With eight men to a room we are dealing with two turmae of cavalry, at maximum sixty-four men plus officers. The officers' suite, at probably 720 + 300 square feet (94.76 square m), is larger than the blocks at Gelligaer of 868 square feet (80.64 square m) but falls short of the infantry block at Fendoch, which is 1088 square feet (101.08 square m). (Richmond, McIntyre *et al.*, 1939: 134; Simpson and Richmond, 1941: 1-43; Birley and Richmond, 1942: 161).

However, with only seven rooms it is possible that eight men plus two officers were permanently outposted to Outerwards (Newall, 1976: 115-117).

Secondary post holes were cut through sleeper trenches which had been refilled when the beams were removed and contained occupation debris. Where the post holes penetrated subsoil, the upcast packed round the posts provided traces of a distinctive yellow capping patently higher than the fill of the sleeper trenches. These had been reduced to a few inches deep on the west but increased to 1.0 foot (0.71 m) deep at the east end, and post holes rose progressively higher above them. Apart from three internal ones, post holes followed the sleeper pattern but the complete plan was not recovered. Several along the outer walls had been recut to a lesser depth.

Again the officers' block embraced the three most easterly rooms. A hearth lay in the middle room, but in the largest unit was an oven 3.0 feet 6 inches (1.07 m) in diameter by 1.0 foot 3 inches (0.38 m) deep. A similarly situated 'furnace' at Carzield was attributed to the armourer (Birley and Richmond, 1942: 158). Like the Whitemoss oven it was thickly lined with clay. A nearby primary hearth held leached ashes under 6.0 inches (15.15cm) of burnt wood. The oven, over a little ash, had a 5.0 inch (12.62 cm) thickness of interspersed layers of silt, clay and wood char under a final wash of clay covered by 4.0 inches (10.1 cm) of silt with traces of char and daub.

The surrounding floor was covered with weathered disintegrated charred wood, and burnt red daub so widespread that it had been levelled off to provide a hard surface for the clay floor levelling of the third period building. To the east, it spilled down the slope of the adjacent hollow (see below).

From one of several hearths ranged along the south wall of the contubernia came fragments of a buff-coated hard red ware mortarium stamped G.V.M.P.

The third period building outlined on the east by fragmentary clay sills 2.0 feet (0.61 m) wide was at least 158 feet (48.18 m) long by 35 feet (10.66 m). Apart from the almost intact sills on the east, mere vestiges edged a minor 12 feet (3.66 m) wide street to the north, while of the south wall discrete plough-scattered clay patches survived. At the east end, a room 46 feet (14.02m) long had a cobbled area along the north side. Towards the south-west corner, floor tiles survived and seemed to outline an area 3.0 feet (0.42 m) square and an open area 2.0 feet 6 inches (0.77 m) wide adjacent on the west. This may be fortuitous. The whole area may have been tiled.

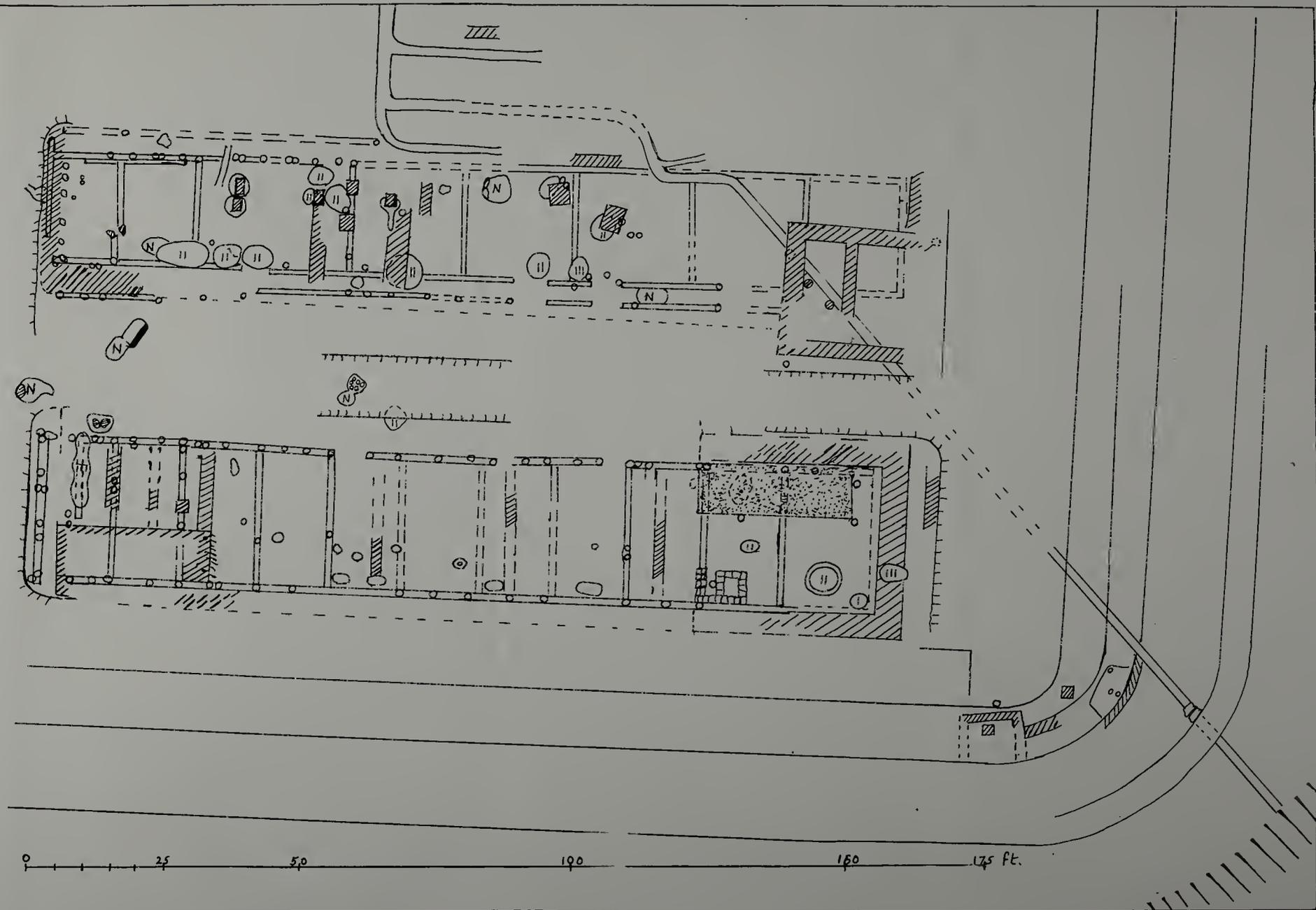
The remainder of the building was divided by vestigial clay sills into areas 25 feet (7.62 m), 22 feet (6.67 m) and 29 feet (8.89 m), with, at the west end, a final area 29 feet (7.93 m) long. Here a rectangular scatter of clay and brick along the south side might have been the remnants of a bench. To the north of this the room

Figure 3

Opposite; facing page 78.

The Barracks and Stables

Third period features are hatched



was divided into units 15, 10 and 16 feet (4.58, 3.05 and 4.88 m) wide. From small hearths in the central areas came slag, coal, bar and rod iron, and broken implements. Workshop activity is indicated.

The South-East Corner

Just east of the possible workshops the ground dips markedly into the hollow. This feature so exercised the fort construction party that they excavated a sump in the corner at least 10 feet (3.05 m) deep (Trench 135). This was immediately filled with boulders and, except for a narrow gap along the west side, was resurfaced with the upcast till which had so coalesced with the matrix that it had to be excavated from beneath. The gap, which was edged by an oak beam (specimen cut, Hunterian Museum, 1952: 87), acted as an inflow from the intervallum street drain in two periods.

The evidence behind the rampart was of extensive destruction in two periods, and of three intervallum streets separated by levelled destruction material. The full section (Trench 176) reveals a turfy pre-rampart mound equipped with a clay and cobble kerb. Behind, the marshy builders' level was partly cobbled. Over the earlier mound was the fort rampart, with behind it, overlying the earlier kerb, a 6.0 feet (1.87 m) wide turf bank which had supported a substantial timber and daub structure, completely burnt out. Immediately behind, the 12 feet (3.66 m) wide street sloped up towards the turf bank. A drain edged the street. Within the fort, two spreads of clay with leached earth between represented the builders' and the primary fort levels. Through the upper passed a sleeper trench.

In a second period the structure behind the rampart was replaced and rose towards it. The barracks area was resurfaced and a post hole replaced the sleeper. Again there was widespread destruction. The second timber and daub structure was completely burnt out. We probably have the evidence for two successive ascensus.

The burnt-out red daub and wattling of the barracks wall spread downslope towards the street, where it petered out over a layer of occupation earth which had almost choked the street drain. Overlying the bright red layer was a continuing downwash of red silt, which gradually shaded upwards through pink to normal grey silt to a depth of 1.0 foot (0.7 m), of which the top inch or so (4.0 cm) was leached white beneath the pressure of exceptionally heavy bottoming driven in to support a third intervallum street. The silted area in the south-east corner covered some 40 feet (12.9 m) by 25 feet (7.62 m). That it represents a comparatively lengthy period of abandonment is patent.

In the third period, with the fort drain now buried and its outflow end covered with slipped rampart turf and carbonised wood traces suggesting weather boarding, the berm round the south-east corner was tightly cobbled and the damaged rampart fronted by an additional 6.0 feet (1.83 m) of laminated turf, which continued along the east side.

South of the superimposed ascensus, the earth bank behind the rampart had been provided with heavy timber facing, perhaps to support access to the ascensus. Within the fort, the scatter of daub and char from this contained nails and larger bolts, some broken. Since it is possible that under the stress of heavy falling timbers hot metal will bend, it is incumbent upon those who suggest removal by the claw hammer to demonstrate the actual damage to the nails.

North of the ascensus the earth bank ceased.

A rectangular hearth, neatly kerbed, was set into the back of the rampart. In the corners farthest from the rampart were post holes, and nearby were recovered iron rings, a hook, and several iron rods. We envisage a horizontal pole supported on two forked posts rising from the post holes.

The ashes of this hearth overflowed the sides and were covered by yellow clay, possibly rampart slip. A second period of use saw an even greater accumulation and spread of ash. This level, too, was covered with yellow clay.

Farther north, several post holes survived of a small building backed against the rampart.

South of ascensus and manning bank, one post hole and a stretch of freestone sill possibly indicated a corner turret. No sleeper trench was located and in the final period the entire area was cobbled.

The Praetentura

One trench in the fore part (Praetentura) of the fort located the L-shaped return where the centurial suite of a final period barracks joined the contubernium. The wall, on a sill of clay and cobble 2.0 feet 3 inches (0.69 m) wide, had a single course of flat stones, 1.0 foot (0.31 m) wide, along the front. The rear 6.0 inches (15.15 cm) was covered with floor tiling, and between, a 9.0 inch (0.22 cm) wide wall vestige remained intact. Sandwiched between 1.0 inch (2.55 cm) bands of charred wood lay red daub. Burnt daub and char scattered around, possibly by the plough, followed closely the line of the wall, and much unburnt dark brown daub

with wattle channels was scattered around. This, the first indication of burning at the final level over the entire site, apart from a spread of red daub and char at the south end of the granary, caused much thought. However, the unburnt daub could not have been found had the inner and outer planking not been removed first and the wall then cast down. It would appear, then, that we have clear evidence of deliberate dismantling, the side walls having been taken down to allow of larger timbers, perhaps even the wall cladding, to be recovered. In view of this, the burning of the mere footing of the wall seems unnecessary. Perhaps it was done after the Romans left. The vandalism of an evacuated site is a common practice.

In support of this evidence, of the casual hearth within the Aedes, and the apparent removal of the south gate posts, reinforced by the general lack of evidence for burning, is a roughly built hearth located on top of the end sill of the cavalry barracks. Built of broken floor tile pushed together and surrounded loosely by stones, this suggested the casual work of a demolition party. From it came a sherd of mortarium of hard black paste, red-surfaced with cream slip bearing a leaf frond variety of herringbone potter's stamp (Find 7.54.1009; Hunterian Museum, 1954: 283). This is considered by K. Hartley to have been made in Scotland and compared with vessels from Mumrills (Hartley, 1976: 85, where the reference is wrongly given as 1954: 293).

An internal sill divided the block defining a room 8.0 feet (2.44 m) wide adjoining the contubernium. A verandah might have been indicated by a stone pier, but to the west a clay sill crossed its possible line.

Of the second period, three post holes filled with stones and dark earth, one with a large iron hook within it, were located beneath or partly beneath the sills.

This evidence fortunately survived in a pocket of deeper earth. To the east, rock rose almost to the surface. A faint ghost of a sleeper trench ran towards it.

A similar barracks facing the above would leave room for a third to the north. The Praetentura, then, possibly housed the six infantry barracks of a quingenary equitate cohort, the barracks for four turmae of cavalry being in the Retentura.

The Stables (Figure 3)

North of the cavalry barracks, sleeper trenches outlined a building 18 feet (5.44 m) to 20 feet (6.1 m) wide, with along the south side a space 3.0 feet (0.92 m) wide increasing to 5.0 feet (1.53 m) to the west, limited by a trench which may have supported posts or lengths of hitching rail.

Internal divisions demarcated from the west, rooms 11 feet 6 inches (3.53 m), 13 feet 6 inches (4.12 m) and 27 feet (8.23 m), by 20 feet (6.1 m). The first was entered from the west and probably gave access to the second. The floors of these two rooms were devoid of the rough gravel of the other rooms and were carefully smoothed. They may have housed grooms.

Entrance gaps 4.0 feet 6 inches (1.37 m) to 5.0 feet (1.53 m) wide in the south wall indicated another four rooms c. 20 feet (6.1 m) square. A final room at the east end was inferred from a short stub of sleeper trench and its distance from intervallum street cobbling. The north wall was interrupted, and gaps may have faced the Via Quintana. In particular it was broken near the west end of the third room, whence a drain ran north.

Towards the east in the great hollow, so sodden was the ground that it was finally impossible to distinguish the sleeper trench sides, and the task was perforce abandoned. A maximum length of 155 feet (47.24 m) was indicated.

During occupation the situation was relieved by the main drain. The sleepers had lain over it as it crossed the last two rooms, and for 15 feet (4.58 m) it followed the line of the north wall. Wooden covers must have supported beams, although across the rooms access to the drain may have been allowed.

Despite the drain, at least two secondary post pits held at bottom the charred logs of small corduroy platforms. Charred red daub lay thickly around.

At the west end, the north wall of the two smaller rooms had been repaired. From the shallower length of recut sleeper trench came a sestertius of Hadrian (Find 7.59.1132; Hunterian Museum: 1954: 154).

In the second period, post holes followed the sleeper trenches of the north wall but the south wall was not reused. Large pits cut through its sleeper trench and blocked the entrance to the third room and completely removed that to the fourth. The south wall was now the outer sleeper alignment, which was followed closely by post holes. The pits lay mainly near this south wall within a roughly metalled floor. They held silt which almost filled them, with traces of char and dark matter. They were possibly dung pits. That they did not exist in the primary may be due to the more porous nature of the floor at that level, and the possibility of drains other than those located having been employed.

Two post holes on the north might point to a verandah or hitching rail near the west end fronting the space occupied by the three primary rooms. To the east, a drain ran alongside the building, turning to join the main drain.

The space occupied by the second room in the primary block now held a dung pit, thus only the end space was available for grooms, but the west end was now 5.0 feet (1.53 m) wider.

While paired post holes might have indicated the ends of inner divisions, the spacing did not present a reasonable pattern. Some post holes were recut, possibly replaced, suggesting repair as at the barracks and Principia, and as in the primary building.

Stabling has been discussed by Simpson and Richmond (1941) and by Birley and Richmond (1942: 160-161), and recently by Dixon and Southern (1992: 181-201).

In general, an allowance of 50 square feet (4.65 square m) per mount is acceptable, but stall widths as narrow as 3.0 feet (0.92 m) have been suggested. Five feet (1.53 m) is clearly ample (Dixon and Southern, 1992: 182-184). Whether, then, the horses were tethered along the outer walls or, as seems more probable, the inner divisions (Dixon and Southern, 1992: 184), the 20 feet square (6.1 square m) rooms at Whitemoss could each house eight mounts, with a further three to four in the largest, 27 feet (8.23 m) long, room, giving a total of 52. This falls short of the 60 required for the establishment, granted the outposting of eight men and possibly two officers to Outerwards, if indeed a total of 70 steeds were required for two *turmae* (Simpson and Richmond, 1941). This is based on a *turma* strength of 30 men, plus 10 extra mounts for officers. A 32 man unit would require 74 horses.

It might be argued that a 4.0 feet (1.22 m) lateral allowance per mount would suffice (Dixon and Southern, 1992: 182, 184), which at ten horses in each block plus four, plus ten outposted, would in fact give a total strength of 74 mounts.

Whatever the truth, we conclude that the northern building in the *Rententura* east is a stable. As only the western third was totally excavated (Piggott, 1957: 25), as was the barracks, the remainder being selectively trenched, further pits probably exist.

Miller (1922: 34-35) adduces evidence for the co-operative service of infantry and cavalry, including the sharing of living quarters. This is clearly not the case in

the cohort forts, but it is possible, even necessary, that they exercised together, for a detached vexillation might well combine infantry and cavalry. It would seem reasonable to assume that centurion and decurion, with their supporting staff, should know each other and learn to work together. The possible division of the stable block into six units might indicate the attachment of two groups of cavalry to each century. This would involve the allocation of 20 mounts, four over the requirement for 16 men, being available for officers.

In the final period, a street only 12 feet (3.66 m) wide lay between the stables area and the possible workshops. The entire area to the north was tightly cobbled, within a surround of which faint traces of clay survived, but clearly outlined the west end and south-west corner.

Towards the east, clay and cobble fragmentarily outlined a room 19 feet (5.79 m) N-S by 24 feet (7.32 m) divided into rooms 9.0 feet (2.75 m) and 13 feet (3.40 m) wide. To the north, where the Via Quintana now sealed all earlier drains and post holes, there was little indication of walling. The building appeared to have lain open to the street.

Within the cobbled floor were rectangular clay and cobble piers, edged in three cases by small post holes. While some overlay earlier pits they did not fill them. Others overlapped pits or lay clear of them. A group of six presented a rough symmetry. Others may exist towards the east. In addition, two apparent division sills were suggested by a thickening of the cobble layer. These ran from the south wall but did not reach the north. Apart from a short stretch of clay sill, these features alone occupied the building. We have no suggestion as to its function.

The Main Drain

Along the west side of the granary ran the main drain of the fort. This had been dug before the buildings were erected, to assist in draining especially the marshy hollow. At bottom a spread of burnt wood in fast silt from a mere trace to 2.0 inches (5.1 cm) deep is referable to the fort builders. From it came the reeded rim of a black ware vessel (Hunterian Museum, 1953: 291). Fragments of a similar bowl rim in hard gritty red clay probably came from the builders' layer behind the pre-fort rampart to the north. Also from the drain bottom came a vessel of hard-fired grey ware, black fumed but with a lighter grey coat internally (Plate 3). These vessels would have fitted comfortably into a Traianic-Hadrianic bracket (Richmond and Gillam, 1953: 36). They are survivals in the early Antonine period. Of prime importance is their evidence that the drain was never cleaned out.



Plate 3

**Fumed grey ware vessel from the bottom
of the main drain of the fort
(Restored)**

Dug 2.0 feet (0.61 m) deep from the primary surface it sloped from 2.0 feet (0.61 m) in width to 1.0 foot (0.30 m) across at bottom. It was examined in several sections.

A primary grey silt, over the initial black layer, was interspersed with fine washes of yellow soil from the sides and gravel, with the occasional faint line of vegetation not quite reaching both sides. This was finally sealed by a thicker band of yellow soil wash, sealed in turn by a 1.0 inch (2.55 cm) thick black vegetation layer which rose up the side nearest the Principia, and lay alongside as a layer of 'char' formerly presumed to result from burning, but while some burnt matter was present it was discrete.

A second fill of grey silt, yellow washes, discrete vegetation streaks, and gravel accumulated. This was a little deeper than the primary, but the difference persisted in all sections. The cross-sectional ratio of secondary to primary at the watershed opposite the Cross Hall was 1.65: 1.0. This increased to 2.5: 1.0 at the south end, and to 2.1: 1.0 towards the north. At the rock cut extreme north section it was 2.8: 1.0. At both ends, washed down deposits would collect, but the average suggests a secondary occupation plus abandonment almost twice the duration of the primary. Over the upper silt, and merging with it, passed a wash of black material containing burnt wood, which yielded to an overlayer of black silted soil of which it was largely the origin and which passed up the side of the drain. Some 2.0-4.0 inches (5.1-10.1 cm) thick, this seemed to reflect a period of abandonment lengthier than that which preceded the secondary occupation.

In the final period the drain was packed with gravel, clay and wattle and cobbles, rammed so hard that it was forced up the sides of the drain. On north and south, solid stone packing with clay carried the third period streets over the now disused drain.

The Fort Annexe

North of the fort an annexe was defended on the west by a ditch 15-16 feet (4.58-4.88 m) wide by 6.0 feet (1.83 m) deep, separated by a cobbled berm from a 16-18 feet (4.88-5.49 m) wide turf rampart. A palisaded revetment of rough cobbles rose from a trench 1.0 foot 6 inches (0.46 m) wide along the edge of the ditch scarp.

Near the south-west corner, numerous floor tiles were scattered on the surface. Limited trenching revealed a rectangular pit, 4.0 feet 6 inches (1.37 m) deep by 14 feet (4.27 m) by at least 10 feet (3.05 m). The pit was filled with burnt clay and

wattle walling to almost half depth. Within the hollow which remained, lead was smelted and plate glass run. Finally, over a thick charcoal layer which partly covered the remains, the pit was filled with heavy stones and numerous tile fragments, and the site was levelled. Close by, a series of soot-choked narrow trenches possibly survived from a channelled hypocaust.

Farther north, the sill wall of a building was located but this was not explored.

Small Finds

For reasons outlined in Part 2: *The Place of Whitemoss in Roman Scotland*, the customary section on small finds is omitted. The finds book is lodged, along with the excavation note-books and photographs, in the Hunterian Museum. The student by following these can lay out the base lines, insert the trenches on plan, one by one, and by reference to the sections and descriptions can re-excavate the site and relocate most of the finds. Several sherds have been referred to in the text. Here we mention the very first find made by us, at the foot of a pylon, possibly the same find spot as a Samian sherd mentioned by Steer (1951: 31). Our find was the rim and wall sherd of a brick-red rough-ware vessel similar to form Walters 80. Of interest also are amphorae handle sherds stamped M F P and M M C followed by S V R ligatured. The latter, one example of which was securely dated at the Monte Testaccio to 161 A.D. by its frequency of occurrence, suggested to Callender (1949: 78) a re-provisioning of the Scottish sites sometime in mid-second century. It may mark the onset of the second occupation. However, dated sherds are few, and ceramic dating is open to subjectivity. In a different case are coins. A report on the coins from Whitemoss by Professor Robertson is given later (Appendix 1).

Discussion

The excavations have suggested a second occupation at Whitemoss of some duration, following an initial occupation which closed in destruction. That it was longer than the first is hinted at by the greater accumulation of ash in a secondary hearth, while the cross-sectional ratios of secondary to primary silting in the main drain of the fort and in ditch B on the south-east lend conviction. This occupation also closed disastrously.

Discussing the upcast from the Antonine ditch at Rough Castle, Macdonald (1925: 287) concluded that the evidence meant "that the interval between the original construction of the fort and its first restoration was shorter than the time which elapsed between the first restoration and the second", and later stressed that the depth of the upper layer of upcast "points to an unbroken occupation of

considerably more than four or five years" (Macdonald, 1934: 479). Miller (1952: 239) implies that the ditch may have been cleaned out during occupation, but fails to present the visual evidence of such cleaning.

We may state emphatically that the silt at the bottom of the Antonine Ditch is a most effective defence, having found our feet embedded in it on more than one occasion, and that even with the sides of our excavation trench to assist we extricated ourselves with difficulty. Why clean it out?

To return to ditch B and the main drain at Whitemoss, we can see that as long as the fort drainage was functioning, carrying rainwater and the fort's waste to the ditches, silting would continue, but once the flow ceased and the water drained off then the channels would become overgrown and finally sealed with vegetation. Once this was established, deposition would be very slow but would continue until the fort refunctioned, sending effluent to arrest and finally drown the growth. Applying this argument to Rough Castle we conceive that the fort effluent, via drains etc, might maintain a formidable barrier, but once the ditch became overgrown, hence more readily run over, it would require cleaning out. What is of matter is that it was cleaned out twice.

If we accept that Whitemoss was founded in 140 AD and abandoned c. 155 AD, an occupation period of 15 years, by applying the ratios calculated from the silt we have dates for the second period from 158 AD to 180, 183, 194 and 218 AD. The average ratio provided 158-188 AD.

However, the excavation of Outerwards in 1970 (Newall, 1976) led to a reconsideration of the evidence. The extent of damage at the fortlet implied an abandonment of some duration, and a spread of vegetation over the surface of the ruined barracks showed that at least three years were required for this to form, plus an unspecified time for it to become established. We suggested that "ten years would seem nearer the mark than five". To test this, a round-house was excavated in 1971 at nearby Martin Glen, left open and visited and photographed yearly. In 1975, when the Outerwards report was in preparation, we could not foresee overgrowth within the following three to four years (Newall, 1976: 117, 122).

The Martin Glen experiment is now concluded (Newall and Newall, 1980: 47-48). We have recorded that in 1973 a thin spread of algae had covered the sunken threshold and hall slabs, but in 1974-1975 had been overspread by silt and did not reappear. With this may be compared the trifurcation of vegetation lines close to the west rampart of the Roman fortlet, where initial growth was probably arrested by downwash from the rampart.

In 1974 moss had taken root on the round-house wall, and by 1975 had largely if sparsely enveloped the wall which supported a scatter of grass tussocks. A few grassy patches had spread to the interior. These extended gradually, and by July 1979, our last visit, had established a fair though discontinuous cover. By 1981 the interior would probably be almost covered over.

It would appear to follow that at Outerwards Roman fortlet the period of abandonment was of some eight to ten years, tending more probably towards the latter. Our criterion for comparison was the hard infertile sandy till of the round-house floor and the equally unresponsive burnt red clay which overlay the primary Roman surface.

We concluded that "It would seem reasonable to conclude on the assumption that Antonine I ceased c. 154-5 AD., Antonine II did not begin at Outerwards until c. 162-5 AD", and that such dating "would allow for the transfer to Scotland post 163 AD of the First Cohort of Vardulli from Corbridge, if indeed it was there in full strength, and of the First Cohort of Hamian Archers from Carvoran".

Here we repeat our conviction that the history of the outlying forts is the history of the Antonine Wall. Without it as a complete frontier there seems little logic in having the western flank securely covered. On the Outerwards evidence, the Wall was held twice as a frontier, but with an eight to ten year interval, long enough for the Antonine Ditch to grass over.

Here we may add that in the 1950s an over-enthusiastic student cut several short trenches at Lurg Moor fortlet. While this private enterprise was quickly terminated, we recorded that a short trench beside the east rampart showed two levels of cobbling

Reconsidering our notes in view of the Outerwards evidence, we realised that the many references in them to "char", "sooty earth", "dark soil evolving from a spread of burnt wood", "carbonaceous earth" were all pointers to a well-established cover of vegetation. Indeed, the fact that this actually passed down the sides of the main drain, a rather difficult position for burnt material, and the obvious thickness where we had recorded a spread of vegetation over the ditch filling, convinced us that Whitemoss had shared the fate of Outerwards. At one point behind the east rampart we have recorded a spread of "char" with red patches "coming up from below", i.e. via mole channels. We now see it as vegetation over burnt clay.

At Martin Glen an internal palisade trench, 1.0 foot (0.31 m) deep and stone-packed, was eventually largely obliterated by soil wash and the overgrowth, but was visible as was the sunken threshold. A little spadework would have allowed us to recover the plan and set up fresh posts in the trench. In the larger fort area, building sites are closely outlined by the street grid, and vegetation might tend to follow the lines of sleeper trenches. In fine, ten years is not too long a period to prevent re-occupation along established lines, but it would involve much site clearance and scraping.

If, then, we accept the Outerwards-Martin Glen evidence, the stratigraphically attained dating for Whitemoss is modified to from c. 164 AD to c. 185, c. 188, c. 199, and c. 223 AD, and the average adjusts to c. 193 AD.

The third period clearly attested at Whitemoss followed a period of abandonment longer than the first. While vegetation would take the same time to seal ditches etc, and thereafter only thickness of growth would provide a clue, we have to allow for the accumulation of 1.0 foot (0.31 m) of silt over secondary washed out char and daub in the south-east corner. Re-occupation before 197 AD seems to be impossible. If so, the third occupation at Whitemoss and at Old Kilpatrick is Severan. As the Severan intent was not to recreate a frontier, but rather to provide a forward base and winter quarters for a northern campaign, it does not follow that all forts on the Wall would be required.

Appendix 1

Report on the Coins from Whitemoss Roman Fort, provenance having been supplied by the Excavator.

By Anne S. Robertson

8/52/565

Sestertius of Trajan.
Reverse smooth. Humus. Well worn.
Coin now lost.

7/53/781

(Find 1953.318). Brass. Area 181. Within cobbling of Via Quintana, but beneath top levelling.

Dupondius (?) of Hadrian (AD 117-138). Fragments.

Bronze. Weight of largest fragment 2,617 g. Size 26 mm. Axis ↓.

Obverse: Legend uncertain. Head of Hadrian, radiate (?), right.

Reverse: Legend uncertain. Female figure, draped, standing left, holding cornucopiae in left hand.

Not badly worn.

7/53/782

(Find 1953.317). Denarius. Area 182. Near bottom of secondary, brown levelling layer.

Denarius of Nero, (AD 54-68).

Silver. Weight 1,247 g. Size 19 mm. Axis ?

Obverse: NERO (CAESAR) AVGVSTVS. Head of Nero, Laureate, right.

Reverse: Legend and type uncertain. Date of coin: AD 64-68.

Fairly well worn; much corroded.

7/53/821

(Find 1953.316). Denarius. Trench 193. Embedded in clay beneath top level sill wall.

Denarius of Vespasian (?), (AD 69-79).

Silver. Weight 11,541 g. Size 18 mm. Axis ?

Obverse: Legend uncertain. Head, possibly of Vespasian.

Reverse: Legend and type uncertain.

Too corroded to estimate wear.

7/54/1132

(Find 1954.154). Sestertius? Trench 240. Within filling of stable 'sleeper' trench.

Sestertius, possibly of Hadrian (AD 117-138).

Bronze. Weight 14,964 g. Size 36 mm. Axis ?

Obverse: Legend uncertain. Head right, possibly of Hadrian.

Reverse: Legend and type uncertain.

Too corroded to estimate wear.

7/54/1298

(Find 1954.325). Brass. Trench 235. Upcast, but not from top level.

Sestertius of Hadrian (AD 117-138).

Bronze. Weight 15,286 g. Size 33 mm. Axis ↓.

Obverse: Long early legend. Bust of Hadrian laureate, cuirassed, draped, right.

Reverse: Legend uncertain. SC (left and right in field). Figure (female?) seated left on throne (possibly Fortuna or Fortuna Redux).

Very corroded. Not excessively worn.

7/57/1560

(Find 1957.152). Denarius. Area N7. Edge of pit 3. Sealed by top cobbling.

Denarius, possibly of Domitian (or Nerva?).

Silver. Weight 1,452 g. Size 7 mm. Axis ↓.

Obverse: Legend uncertain. Head, fairly small, with longish neck, laureate (?), right, possibly of Domitian (or Nerva?).

Reverse: Legend uncertain. Female figure, standing left.

Very corroded. Not excessively worn.

8/57/1561

(Find 1957.154). As ? Area N7. Edge of pit 3. Sealed by top cobbling.

Fragment of dupondius or As (more likely As), possibly of Hadrian (AD 117-138).

Bronze. Weight of fragment 3,605 g. Size; incomplete. Axis ↗.

Obverse: Legend uncertain. Head laureate (or radiate?) possibly of Hadrian, right.

Reverse: Legend uncertain. Female figure standing left?

Fairly worn.

8/57/1569

(F.1957.153). Brass. Hadrian? Area N8. Trodden vertically into ochre surface beside sleeper trench. Beneath cobbling.

Sestertius of Trajan (Ad 98-117).

Bronze. Weight 13,174 g. Size 33 mm. Axis ?

Obverse: Legend uncertain. Bust of Trajan, laureate, right (drapery on left shoulder?).

Reverse: Legend and type uncertain.

Corroded. Not excessively worn.

Appendix 2

The Neolithic

The first indications of pre-Roman occupation lay under the rear offices of the Principia. A pit under the south-west corner of the Aedes filled with a long slow silt seemed to pre-date the fort builders. Other pits under the south walls and stake holes to the west were also suspect, but the first evidence of relative antiquity occurred in the most easterly room of the office suite. There, close to the east wall sleeper trench, a few faint brown shadows in the yellowish till challenged investigation. As these gradually expanded and darkened under the trowel, we realised that we were slowly reducing a soil which was utterly riddled with burrows, as of threadworms. Such was the impression that we described it as vermiculated. Finally, 6.0 inches (15.15 cm) lower than primary Roman level, we had outlined a haphazard tangle of wood traces around four stake holes 8.0 inches (10.2 cm) in diameter by 1.0 foot (0.31 m) deep. So altered was the charcoal that it had almost lost any indicators of its organic origin and presented a polished surface when trowelled.

It was not until we encountered the same foraminous earth in deeper earth under the east end of the stables that we realised we were gazing at the grass-root channels of a pre-Roman humus, which survived only in the deeper hollows, primary site preparation and secondary grading having removed it elsewhere, except vestigially surfacing some pits.

The stake holes lay on the arc of a circle 14 feet (4.27 m) in diameter. However, we considered them to have supported a shelter backed to the south rather than a permanent dwelling. To the north, in the Cross Hall, three others were found with, nearby, two rectangular pits filled with cobbles in charcoal.

From similar pits between barracks and stables came the first recognisable Neolithic sherds, one with an almost flat everted rim, decorated on the body with vertical continuously interlocking fluting which was carried over the rim. Other pits produced further sherds, hammer stones, flint and pitchstone flakes, and a number of sharp-edged flakes of stone. One pit had had a round-bottomed pot pressed firmly into the subsoil. After some ash had gathered round, this vessel was broken and a second round-bottomed pot was placed on the previous base with but a smear of ash between. From this pit came a little comminuted bone and hazel shells.

The evidence points to a Neolithic autumn camp.

Two of the above pits were sectioned. As a result, it was possible to observe that rising into the overlying yellow till levelling was a convex shadow. The true filling was slightly concave, and, as trowelled down, showed firstly as a dark ring round the edge of the pit with a lighter fill within which increased with depth to the same overall almost black shade.

We concluded that the humus which had formed over the stake holes, and the secondary levelling over the pits and the reduced sleeper trenches, were ultimately derived from the same porous till matrix. This allowed, by osmosis and the movement of earthworms, an upward movement of moisture and ash to form a shadow several inches above the pit. During the 1957 excavations, pits were located by their shadow and soft fill when probed from above with an 'arrow'. Coincidentally, several Neolithic sherds were also located slightly above the secondary Roman level, due to the stone hole for a secondary traffic stop at the north-west corner of the barracks having cut through a Neolithic pit. This resurrection of a long-eroded Neolithic horizon caused no little misunderstanding.

The sherds were classed by Professor Piggott (1957: 25) as of a general Bantaskine-Easterton or Roseisle-Lyles Hill group. Finer tuning lies outwith our discipline.

Meanwhile we recall the prehistoric sherds located at Roman level at Old Kilpatrick, and treat with caution any claims that a settlement may have been dismantled by the Romans to make way for their own buildings.

Appendix 3

Cadder: A Cautionary Postscript

Further evidence of post-primary abandonment was apparently uncovered at Cadder, where Clarke (1933: 24) felt that a drain had been inserted under the Antonine Wall when a ruined section was being repaired. He did find it strange that the drain, at the lowest part of the site, should not have been inserted initially. In fact his instinct was sound, and the drain in question, running north from the inner east ditch of the fort, was primary to the fort. The problem was that the north gate was earlier than the fort, and consequently earlier than all the other drains issuing from it; but with the north gate was provided a short length of primary culvert which had not been re-used. Instead, the main street drain of the fort was cut through the Antonine Wall within 30 feet (9.15 m) of it.

Having had our attention concentrated on this short length within 30 feet (9.15 m) of the gate, we realised that a mile fortlet would have solved the entire Cadder problem; for while the site could accommodate a fortlet and provide wagon parking facilities, it could not adequately contain the fort. The result was that the north and south gates were misaligned.

If we extend 72 feet (21.95 m) south from the north gate, and allow a width of 60 feet (18.29 m), we enclose not only most of the pits in the area but also the greater length of the north and median walls of the site IV building. There, some post holes had been plugged with clay.

In such circumstances, had the second legion capped the gate with a commemorative slab (e.g. R. I. B. 2209), any auxiliary building stone would have recorded construction in the reign of Pius, both stones being of the first Antonine period.

Acknowledgements

My sincere thanks are due to the late Mr. David Baird of Whitemoss Farm who gladly permitted excavations and pre-donated all finds to the Hunterian Museum; to my Field Assistant, Mr. Harry M. Sinclair ("You'll have to prove it!"); to the late Mrs Anne Hallifax Crawford who acted as Public Relations Officer and assisted in trench supervision; to Mr. James Murray, County Engineer, who supplied temporary shelter and laid out base lines; and to the very many colleagues and students of whom only those who toiled throughout the years are named, Mr. Gordon Barr, Mr. Ian Ferguson, Mr. Robert Logan, Mr. Hugh Morrow, Mr. George Richardson and Mr. George Ritchie. I recall with pleasure, as a link with a former era, a visit by Mr. Samuel Smith, Sir George Macdonald's former assistant, who discussed with me the internal divisions of the cavalry officers' block. In conclusion I again acknowledge my debt to Mr. John Clarke and Professor Anne S. Robertson, whose visits to the site were to my advantage.

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THE SCOTTISH NATURALIST

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The Western Naturalist
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The Scottish Naturalist
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